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ABSTRACT

This study explores the construct validity of the Child Behavior Checklist (CBCL), which was created as a standardized tool for recording the behaviors of children aged 4 through 16 as reported by their parents or caretakers. Since its inception in 1983, the CBCL has been applied and tested on numerous clinical samples, yielding an impressive body of quantitative support. Due to the liberal application of the CBCL in child mental health settings, however, it is critical that the validity of the instrument be supported for specific child sub-populations. In this study, the factor structure of the CBCL is explored for different sex and age variations in a sample of 2,628 children presented for treatment at a mental health center in a midwestern city. Results suggest that the subscales of aggression and depression are invariant across sub-samples of the population. No single source of data is sufficient in diagnostic assessment of individual children or adolescents, however. For this and other reasons, cautious use and interpretation of the CBCL is recommended. It is also recommended that the CBCL be used as auxiliary data, employed in conjunction with other data. Includes 10 tables. (KW)

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A Confirmatory Factor Analysis of The Child Behavior Checklist: An Exploration of Age and Sex Differences

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Abstract

This study explores the construct validity of the Child Behavior Checklist (CBCL) (Achenbach and Edelbrock, 1983). Due to the liberal application of the CBCL in child mental health settings, it is critical that the validity of the instrument be supported for specific sub-populations. In this study, we explore whether the factor structure of the CBCL is different for sex and age variations in a sample of 2628 children presenting for treatment at a mental health center in a midwestern city. Result suggest that the subscales of aggression and depression are invariant across sub-samples of the population.

A Confirmatory Factor Analysis of The Child Behavior Checklist:

An Exploration of Age and Sex Differences

Introduction

The Child Behavior Checklist (CBCL) is a prolific instrument utilized for clinical and research purposes. Versions of the CBCL have been translated into 25 languages, with over 500 published studies. Designed by Achenbach and Edelbrock (1983) the CBCL is devised to record in a standardized manner the behaviors of children aged 4 through 16 as reported by their parents or caretakers. Since its development, it has been applied and tested on many clinical samples (Achenbach & Brown, 1989). The authors have presented impressive quantitative support (Achenbach & Edlebrock, 1983).

The diagnoses and treatment of children's disorders, however, is a complex issue. Due to the liberal application of the CBCL in child mental health settings, it is critical that the validity of the instrument be supported for specific populations. Several studies have alerted us to the serious limitations of a checklist approach to the screening of children, when samples are drawn from more general populations (Garrison & Earls, 1985). Moreover, even when an instrument is working well in one setting, it is dangerous to assume that it is also as applicable in different arenas (McMahon, 1984).

Additionally, age and sex differences have been found in the CBCL subscales (Achenbach & Edelbrock, 1983), and thus it is important to continue to explore and test the validity of the CBCL for different populations, and for different subgroups within those populations.

Overall, we are testing the use of the CBCL in a large sample of children who are presenting at a mental health center for mental health services, and in particular if the CBCL can be used similarly with different ages and gender. The present study tests the construct validity and generality of syndromes derived empirically from CBCL reported by parents of clinically referred boys and girls aged 6-11 and 12-16.

One way to test for validity is to use factor analyses as an estimate of construct validity. Due to the empirical manner in which the CBCL was constructed, it is logical to assume that the factor analyses of the profiles should be consistent with the theoretical underlying constructs of the instrument. Thus, our first objective involves factor analyzing the items of the Child Behavior Checklist (CBCL) to determine the factor structure of the fours groups in our sample.

The next logical step is to discover if these factor structures are stable with different sub-populations. The literature suggests differential effectiveness of the CBCL with different populations. So, our second agenda is aimed at determining if the factor structure is different depending on the age and sex of the subjects in a sample of 2628 children who presented for treatment at a mental health center.

Research Hypotheses

1. There will be no significant difference between the factor structures of the items on the CBCL for boys ages 6-11 in our sample as compared to girls ages 6-11 in this sample.
2. There will be no significant difference between the factor structures of the items on the CBCL for boys ages 12-16 in our sample as compared to girls ages 12-16 in this sample.

3. There will be no significant difference between the factor structures of the items on the CBCL for boys ages 6-11 in our sample as compared to boys ages 12-16 in this sample.

4. There will be no significant difference between the factor structures of the items on the CBCL for girls ages 6-11 in our sample as compared to girls ages 12-16 in this sample.

Methods

Subjects

The subjects (N=2515) for this study were chosen from the population of those coming to a mental health center for treatment in a Northeastern Ohio city. Data collection was done as part of the initial assessment process of the agency. The ages range from 6 to 16 years old, with 1310 subjects between the ages of 6 - 11, and 1205 between 12 and 16 years old. Sixty-seven percent are European American, 23% African American, and 10% with other ethnic origins. Fifty-six percent are male, and 44% female. The socioeconomic status of the subjects is generally low, with 50% coming from homes where the income level was less than $5,000, and 75% with incomes less than $15,000. Very few of the subjects came from traditional two parents households.

Instrument

The Child Behavior Checklist (Achenbach & Edelbrock, 1983). The CBCL for ages 4 to 16 is a standardized instrument with 112 items describing a broad spectrum of common problems that parents or caretakers can complete in about 15 minutes. Parents circle a "0" if the item is not true for their child, a "1" if the item is somewhat or sometimes true, and a "2" if it is often or very true. Reliability estimates are good, with test-retest correlations of

.95 for intervals averaging 7 days; inter-parent agreement was .99 (Achenbach & Edelbrock, 1983).

Statistical Analyses

Factor analyses. Factor analyses of the items were run separately for boys and girls, and ages 6-11, and 12-16, using principal component analyses, with 1's in the diagonal, varimax rotation, and an eigenvalue of 1 as an initial cut off. Thus there are four groups: 1) boys 6-11 years, 2) boys 12-16 years, 3) girls 6-11 years, and 4) girls 12-16.

Because many of the items also loaded on other factors, we retained only those loading $>.40$ on the first factor for the syndrome scale based on that factor. For the syndrome scales based on the remaining factors, we retained items loading $\geq .30$. Items that loaded above the cutoff on more than one factor were retained on each of the syndrome scales for which they met the criterion. Although this may increase the inter-scale correlations, it reflects the reality of certain behaviors to covary with more than one syndrome.

Kaiser Factor Matching. The factor structures of the four groups were compared using Kaiser factor matching (Newman, 1971; Galliger & Newman, 1983; Veldman, 1967) to estimate if the age and sex factor structures were significantly different from each other. Specifically, we tested the difference between boys 6-11 to boys 12-16, girls 6-11 to girls 12-16, girls 6-11 to boys 6-11, and girls 12-16 to boys 12-16. Only six factors per groups were compared using this procedure. Cosines of .80 or over suggest meaningful comparisons.

Results

Tables 1 - 4 contain abbreviated statements of the items of each syndrome, with their loadings, and descriptive titles for the syndromes. What can be gleaned is that each subgroup contained about eight factors, with similar titles The titles are congruent with the subscales titles of the instrument. Tables 5 and 6 summarize these data by listing the factor names for each group, and the corresponding eigenvalue.

Tables 7 to 10 report the results of the group comparisons using Kaiser Factor matching. Across sex differences are reported first. Table 7 compares girls 6-11 to boys 6-11. Notice that five of the factors contain similar factor structures. The first two factors, aggression and depression, produced the highest cosines, .99 and .97 respectively. However, Table 8 demonstrates that when boys 12-16 were compared to girls 12-16, only three of the factors contained similar factor structures. As in Table 7, the first two factors, aggression and depression, produced the highest cosines, .99 and .99 respectively.

Next, ages differences within the same sex group are reported. Table 9 compares boys 6-11 to boys 12-16. Here only three factors contain similar factor structures, with aggression and depression, again producing the highest cosines, .99 and .91. Similar results are found when girls 6-11 are compared to girls 12-16. Three factor structures are similar, with aggression and depression producing the highest cosines, .99 and .93.

Discussion

Results of the factor analyses in the respective groups suggests some similarity in subscales among the groups. Each group produced about the same number, and similar

factor content. What can be concluded is that the CBCL does seem to produce factors with face likeness to the subscales of the instrument.

The results from the Kaiser Factor matching suggest that the instrument was more stable for the age group 6-11, which contained significant comparisons of five factors when compared across sexes. This was not true with comparisons between the 12-16 age group which only produced three similar factors. Only three similar factors surfaced across age groups. In all of the comparisons, the first two factors (aggression and depression) surfaced, and thus seem invariant across age and sex groups. Thus, although the CBCL claims to be able to identify 8-9 syndromes, in reality with this sample, it appears that only two are invariant across age and sex groups. It also appears that there is less variance among the subscales in the younger group, ages 6-11.

Importance of study

We need to be more cautious in the use and interpretation of the CBCL. Its use for measurement of treatment effects and program evaluation should be continuously challenged. This is not to suggest that the CBCL is not a useful instrument. Frequently, in our field, partially due to the lack of child assessment instruments, we expect too much out of our tools. What we are suggesting is that the CBCL should be understood to provide information about aggressive and depressive behavior. Additionally, as its authors suggested (Achenbach, 1985), the CBCL should be used as auxiliary data, employed in conjunction with other data. No single source of data is sufficient in diagnostic assessment of individual children or adolescents (Achenbach, McConaughy, & Howell, 1987; Quay, 1986).

Limitations

We acknowledge that any single source of data cannot generalize to other populations or situations. Although a considerably large data set, all of the subjects are presenting at a mental health center for some form of treatment.

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Table 1

Results of Factor Analysis:
Varimax Loadings of Items for Boys 6-11 Years
(N=811)

I. Aggressive					
Argue	.60	Bully	.65	*Destroys others' things	.54
Disobedient at school	.46	Disobedient at home	.68	Lacks guilt	.59
*Jealous	.41	*Fights	.48	*Impulsive	.47
*Lies	.43	Attacks people	.59	Screams	.60
Stubborn	.66	*Clowns	.44	Unliked	.47
Sulks	.40	Swearing	.51	Teases	.50
Temper	.69	Loud	.54	Whining	.41
*Destroys own things	.52	*Doesn't get along with kids	.47		
Eigenvalue	9.54				
II. Somatic Complaints					
Allergies	.36	Asthma	.33	Hears things	.36
Nightmares	.43	Constipation	.33	Dizziness	.55
*Feels guilty	.36	*Overtired	.36	Aches	.53
Headache	.57	Nausea	.57	Eye problems	.33
Stomach prob	.62	Vomits	.53	Trouble sleep	.38
Sleeps little	.30	*Worry	.31		
Eigenvalue	5.35				

III. Hyperactive

Acts too young	.42	Atten deficit	.66	Hyperactive	.60
Clings to adult	.39	*Fog	.48	Daydream	.50
Can't concentr	.33	*Impulsive	.44	Tense	.34
Twitch	.36	Poor schl work	.36	Poor coordinat	.43
Compulsive	.38	*Clowns	.33	Speech problem	.30
*Stares	.39	Excess talk	.42	*Obsessive	.37
Eigenvalue	5.09				

IV. Depressed

*Obsessive	.31	Lonely	.45	*Atten	.37
*Jealous	.34	Fears school	.39	Worry	.47
Fear unloved	.54	Feels others out to get	.51	Worthless	.57
*Fights	.31	Anxious	.39	*Feels guilty	.39
*Self-conscious	.34	*Talk self-kill	.38	*Sad	.43
Eigenvalue	4.96				

V. Social Withdrawal

*Fog	.39	Loner	.48	*Overtired	.34
Refuses to talk	.49	Secretive	.51	*Self-conscious	.37
Shy	.52	*Stares	.39	Underactive	.48
*Sad	.50	Withdrawn	.58	*Worry	.36
Eigenvalue	4.20				

VI. Delinquent

Suicide attempt	.35	*Destroys own things	.32	*Destroys others things	.41
*Lies	.35	Fires	.51	Steals at home	.61
Steals others	.61	Strange beh	.38	Strange ideas	.37
Suspicious	.31	*Talk self-kill	.34	Swears	.36
Truant	.31	Vandalism	.41		
Eigenvalue	3.99				

VII. Sex Problems

Smears Bowels	.55	Cruel to animal	.33	Eats non-food	.33
Picks body	.34	Plays with sex parts in public	.55	Plays with sex parts too much	.57
Sleeps more than other kids	.51	Thinks about sex too much	.35	Wets self	.39
Wets the bed	.30				
Eigenvalue	2.96				

VIII. Obese

*Doesn't get along with kids	.31	*Fights	.34	Gets teased	.44
Hangs with wrong group	.31	Not popular	.42	Overeats	.45
Overweight	.46				
Eigenvalue	2.49				

* = item loads on more than one factor

Table 2

Results of Factor Analysis:
Varimax Loadings of Items for Boys 12-16 Years
(N=617)

I. Aggressive					
Argues	.62	Brags	.52	Hyperactive	.44
*Hyperactive	.44	Bully	.67	Attention	.58
Destroys own things	.42	*Destroys others' things	.53	Disobedient at home	.65
*Disobedient at school	.42	*Doesn't get along with kids	.48	Lacks guilt	.49
Jealous	.55	*Impulsive	.49	*Lies	.49
Attacks people	.62	Screams	.54	Clown	.52
Stubborn	.54	*Sudden changes	.47	*Sulk	.40
*Suspicious	.41	*Swear	.57	Excess talk	.48
Teases	.59	Temper	.70	Threatens other	.70
Loud	.59	Whines	.48	Eigenvalue	11.11
II. Depressed/withdrawn					
*Obsessive	.33	Lonely	.37	*Fog	.48
Day dream	.40	Fears others	.30	Fears school	.33
Fears do bad	.41	Feels has to be perfect	.45	Feels unloved	.43
Worthless	.52	Loner	.50	Tense	.40
Anxious	.52	Feels guilty	.46	*Over tired	.46
Refuses to talk	.46	*Secretive	.43	Self-conscious	.57
*Shy	.47	Stare	.35	Strange beh	.30
Stubborn	.39	*Sudden changes	.48	*Sulk	.56
*Underactive	.39	Sad	.65	Withdrawn	.65

Worry	.62	Eigenvalue	8.38		

III. Delinquent

*Suicide attempt	.41	*Destroys	.35	*Disobedient	.32
Hangs with wrong group	.44	*Lies	.38	*Poor school work	.33
Runs away	.51	*Secret	.39	Fire	.30
Sleeps more than other kids	.31	Steals at home	.51	Steals from others	.57
*Swears	.37	Truant	.53	Drugs	.51
Vandalism	.45				
Eigenvalue	4.57				

IV. Hyperactive

Atten deficit	.58	*Obsessive	.31	*Hyperactive	.52
*Fog	.40	Daydreams	.42	*Disobedient at school	.38
Gets hurt a lot	.36	*Impulsive	.43	Tense	.38
Twitch	.42	Picks body	.37	Poor school work	.43
Poor coordinat	.33				
Eigenvalue	4.01				

V. Somatic Complaints

Dizzy	.34	*Over tired	.46	Aches	.56
Headache	.51	Nausea	.69	Stomach	.69
Vomit	.58	*Sleep more Than other kids	.32		
Eigenvalue	3.68				

VI. Schizoid

Smears bowels	.40	Cruel to animals	.44	*Suicide attempt	.44
*Hears things	.31	Nightmares	.36	Sleeps less than most kids	.40
Talk self-kill	.31	Trouble sleep	.36	Wets self	.39
Wets bed	.30				
Eigenvalue	3.41				

VII. Sex Problems

*Hears things	.35	Plays with sex parts in public	.55	Plays with sex parts too much	.48
Sees things	.31	Sex problems	.48	Strange beh	.34
Strange ideas	.35	Thinks about sex too much	.47		
Eigenvalue	3.20				

VIII. Obese

Acts too young	.32	*Doesn't get along with kids	.37	Teased	.40
Not liked	.43	Overeat	.51	Overweight	.50
Prefers younger	.37	*Shy	.2	*Underactive	.33
Eigenvalue	2.83				

* = item loads on more than one factor

Table 3

Results of Factor Analysis:
Varimax Loadings of Items for Girls 12-16 Years
(N=588)

I. Aggressive					
Argues	.63	Brags	.48	Bully	.60
Demands atten	.48	Destroys own things	.43	Destroys others' things	.51
*Disobedient at home	.64	*Disobedient at school	.45	*Lacks guilt	.54
Jealous	.53	*Fears unloved	.40	*Fights	.49
*Hangs with wrong group	.41	*Impulsive	.55	*Lies	.50
Attacks others	.52	Screams	.62	Clown	.55
Stubborn	.62	*Sudden changes	.51	*Sulk	.45
Suspicious	.41	*Swears	.50	Excess talk	.60
*Teases	.60	Temper	.69	Threatens other	.64
Loud	.65	Whines	.42		
Eigenvalue	10.67				
II. Depressed/Withdrawn					
*Obsessive	.30	*Clings	.30	Lonely	.41
Cry	.46	*Suicide attemt	.39	Eats poorly	.35
Fears school	.46	Fears being bad	.52	Fears has to be perfect	.50
*Fears unloved	.54	Hangs with kids in trouble	.47	Worthless	.64
loner	.32	*Tease	.36	Anxious	.51
Feels guilty	.52	Self-conscious	.46	Shy	.40
*Sudden changes	.38	*Sulk	.37	Talks self-kill	.50
Sad	.59	Withdrawn	.46	Worry	.56

Eigenvalue	6.86				

III. Somatic Complaints

*Tense	.31	*Nightmares	.36	Dizzy	.54
Overtired	.53	Ache	.61	Headache	.67
Nausea	.71	*Worry	.32	Stomach	.69
Rash	.39	Vomit	.43	Other physical	.31
Sleeps more than other kids	.36	*Trouble sleep	.35	*Underactive	.33
Eigenvalue	5.30				

IV. Delinquent

*Suicide attempt	.30	*Disobeys at	.32	*Disobeys at	.53
*Lacks guilt	.34	*Fights	.37	*Hangs with group	.54
*Lies	.35	*Poor schl work	.49	*Runs away	.52
Steals from others	.36	*Swears	.38	Thinks about sex too much	.32
Truant	.62	Drugs	.44		
Eigenvalue	4.57				

V. Hyperactive

Acts too young	.41	Atten deficit	.53	Hyperactive	.45
*Clings	.40	*Fog	.38	*Day dreams	.46
Trouble getting	.44	*Impulsive	.33	Tense	.32
Twitch	.36	Not liked by other kids	.46	*Poor schl work	.36
Poor coordinat	.47	Prefers ynger kids	.33		
Eigenvalue	4.42				

VI. Schizoid

*Obsessive	.32	*Fog	.42	*Day dreams	.39
Refuses talk	.32	Secretive	.43	*Sex problems	.41
Stares	.37	Strange beh	.59	Strange ideas	.44
Thinks about	.31	*Underactive	.32		
Eigenvalue	3.73				

VII. Sex Problems

Behaves like opposite sex	.38	Hears things	.41	*Nightmares	.32
*Sex problems	.52	Sees things	.46	Fire	.40
Speech probl	.30	Vandalism	.30		
Eigenvalue	3.39				

VIII. Obese

Overeat	.67	Overweight	.71	Underactive	.41
Eigenvalue	2.45				

* = item loads on more than one factor

Table 4

Results of Factor Analysis:
Varimax Loadings of Items for Girls 6-11 Years
(N=499)

I. Aggressive

Argues	.66	Brags	.44	Bully	.68
*Demands Atten	.53	*Destroys own things	.47	Destroys others' things	.49
Disobedient at home	.70	Trouble getting along with kids	.60	Lacks guilt	.61
Jealous	.52	*Fears unloved	.51	*Feels others are out to get	.43
Fights	.56	*Impulsive	.49	*Not like by other kids	.40
Attacks others	.60	Screams	.64	Clown	.47
*Stubborn	.55	*Sudden changes	.55	*Sulk	.52
*Excess talk	.41	Teases	.57	Temper	.68
Threatens others	.60	Loud	.59		
Eigenvalue	11.22				

II. Depressed/Withdrawn

Obsessive	.35	Clings	.41	Lonely	.42
Cry	.53	*Demands atten	.32	Fears others	.33
Fears school	.39	Fears being bad	.41	Fears not perfect	.49
*Fears unloved	.43	*Hangs with kids in trouble	.34	Worthless	.49
Anxious	.46	Feels guilty	.50	Self-conscious	.50
Shy	.52	*Sudden changes	.39	*Sulks	.41
Trouble sleep	.30	Sad	.53	Withdrawn	.48
*Worry	.51				

Eigenvalue	6.13				

III. Hyperactive

Acts too young	.56	Atten deficit	.62	Hyperactive	.45
Fog	.44	Day dreams	.48	Disobeys at school	.42
Hurt a lot	.45	Teased	.34	*Impulsive	.39
*Not like by other kids	.33	Poor schl work	.52	Poor coordinat	.53
Prefers younger kids	.35	Speech probl	.33	Stares	.38
*Excess talk	.42				
Eigenvalue	4.87				

IV. Delinquent

*Destroys own things	.46	Destroys others' things	.50	Hangs with wrong group	.41
Lies	.39	Compulsive	.32	Fires	.35
Sleeps more than other kids	.35	Smears bowels	.31	Steals at home	.63
Steals others	.60	Swear	.40	Vandalism	.46
Wets self	.33	Wets bed	.33		
Eigenvalue	4.62				

V. Somatic Complaints

Nightmares	.32	*Anxious	.33	Dizzy	.39
Aches	.66	Headache	.63	Nausea	.68
Stomach	.62	Vomit	.50		
Eigenvalue	3.90				

VI. Schizoid

Hear things	.43	Loner	.43	Bites nails	.33
*Twitch	.32	*Nightmare	.36	Refuse to talk	.37
Secretive	.43	Sees things	.40	Sleepless	.37
*Stares	.31	Strange beh	.31	Trouble sleep	.31
*Worry	.35				
Eigenvalue	3.67				

VII. Sex Problems

Cruel to animals	.37	*Twitch	.42	Picks body	.36
Plays with sex parts in public	.58	Plays with own sex parts too much	.59	Sex problems	.40
Thinks about sex too much	.39				
Eigenvalue	3.15				

VIII. Obese

*Hyperactive	-.32	*Not liked by other kids	.35	Overeat	.66
Overweight	.66	Underactive	.52		
Eigenvalue	2.71				

* = item loads on more than one factor

Table 5

Listing of factors for each group of boys and corresponding eigenvalues

Boys 6-11

FACTOR	EIGENVALUE	FACTOR	EIGENVALUE
Aggressive	9.54	Social Withdrawal	4.20
Somatic Complaints	5.35	Delinquent	3.99
Hyperactive	5.09	Sex Problems	3.15
Depressed	4.96	Obese	2.71

Boys 12-16

FACTOR	EIGENVALUE	FACTOR	EIGENVALUE
Aggressive	11.11	Somatic Complaints	3.68
Depressed	8.38	Schizoid	3.41
Delinquent	4.57	Sex Problems	3.20
Hyperactive	4.01	Obese	2.83

Table 6

Listing of factors for each group of girls and corresponding eigenvalues

Girls 6-11

FACTOR	EIGENVALUE	FACTOR	EIGENVALUE
Aggressive	11.22	Somatic Complaints	3.90
Depressed	6.13	Schizoid	3.67
Hyperactive	4.87	Sex Problems	2.96
Delinquent	4.87	Obese	2.49

Girls 12-16

FACTOR	EIGENVALUE	FACTOR	EIGENVALUE
Aggressive	10.67	Hyperactive	4.42
Depressed	6.86	Schizoid	3.73
Somatic Complaints	5.30	Sex Problems	3.39
Delinquent	4.57	Obese	2.45

Table 7

Comparison of Factor Structure: Boys 6-11 compared to Girls 6-11

Cosines from Kaiser Factor Matching

	Girls 6-11 Factors					
	1	2	3	4	5	6
Boys 6-11						
Factor 1	0.9951	0.0622	0.0035	0.0454	0.0609	-0.0369
Factor 2	-0.0506	0.9685	0.1718	-0.0674	0.0768	0.1100
Factor 3	-0.0020	-0.1440	0.9505	0.0137	0.0144	-0.2672
Factor 4	-0.0260	0.0761	0.0196	0.8886	0.2024	0.0039
Factor 5	0.0152	-0.1029	0.2468	0.0237	-0.3512	0.8882
Factor 6	0.0799	-0.0776	0.0705	-0.3766	0.7609	0.2158

*cosines $\geq$.80 indicate similar factor structures and are underlined

*Only six factors were used for comparisons

Table 8

Comparison of Factor Structure: Boys 12-16 compared to Girls 12-16

Cosines from Kaiser Factor Matching

	Girls 12-16 Factors					
	1	2	3	4	5	6
Boys 12-16						
Factor 1	0.9969	0.0137	-0.0070	0.0229	-0.0236	0.0350
Factor 2	-0.0200	0.9856	0.0554	0.0786	-0.1091	-0.0363
Factor 3	-0.0120	0.0146	-0.7623	0.6146	0.1908	-0.0620
Factor 4	-0.0057	-0.0034	0.5645	0.5814	0.4697	0.3244
Factor 5	0.0309	0.1508	-0.1910	-0.5006	0.8235	-0.0030
Factor 6	-0.0578	-0.0376	-0.0727	-0.0338	0.0876	0.4306

*cosines $\geq$.80 indicate similar factor structures and are underlined

*Only six factors were used for comparisons

Table 9

Comparison of Factor Structure: Boys 6-11 compared to Boys 12-16

Cosines from Kaiser Factor Matching

	Boys 12-16 Factors					
	1	2	3	4	5	6
Boys 6-11						
Factor 1	0.9935	-0.0541	0.0684	-0.0410	0.0623	-0.0832
Factor 2	-0.0087	0.9061	0.2134	-0.2060	0.1584	-0.2451
Factor 3	-0.0109	-0.0100	0.4649	0.8238	0.0490	-0.3052
Factor 4	0.0138	0.0052	0.4373	-0.0003	0.4985	0.7455
Factor 5	-0.0620	-0.1419	-0.2544	-0.0671	0.7702	-0.3370
Factor 6	0.1021	0.3163	-0.2225	0.2168	-0.2766	0.3584

*cosines $\geq$.80 indicate similar factor structures and are underlined

*Only six factors were used for comparisons

Table 10

Comparison of Factor Structure: Girls 6-11 compared to Girls 12-16

Cosines from Kaiser Factor Matching

	Girls 12-16 Factors					
	1	2	3	4	5	6
Girls 6-11						
Factor 1	0.9931	-0.0751	0.0626	0.0171	0.0032	-0.0603
Factor 2	0.0536	0.9286	-0.2971	-0.0752	-0.1522	0.0376
Factor 3	-0.0172	-0.1304	0.0809	0.5855	0.6396	-0.2214
Factor 4	-0.0465	-0.1829	-0.8160	-0.1129	0.4397	0.2545
Factor 5	-0.0169	0.0728	-0.1559	0.6162	-0.2052	-0.2736
Factor 6	-0.0137	0.1016	0.0600	-0.5034	0.3481	-0.7358

*cosines $\geq$.80 indicate similar factor structures and are underlined

*Only six factors were used for comparisons